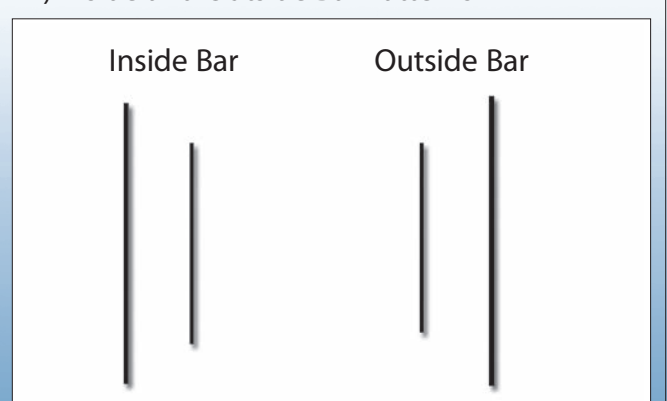# Multiday Pattern
on the DAX

Two of the most famous patterns that are often implemented as defaults in technical analysis software packages are Inside Bars and Outside Bars. In this article we check their efficiency with a trading system on the DAX future. Let us first analyse the two patterns which form the basis for the entry logic of our strategy (Figure 1). They are extensively discussed in the literature (e.g. see [1] from where we took some basic ideas for this article).

■ The Inside Bar pattern expresses a static, indecisive market phase. The prices move within the range of the previous bar and do not have enough power to move above the previous day's high or below the previous day's low. Most traders are standing on the sidelines waiting for a break of this equilibrium. They are ready to enter long in case the prices move above the previous day's high or to enter short in case the previous low is penetrated. But if none of these two extreme points is reached, an Inside Day will be completed. The strategy Inside Out waits for this completion and enters a long position one tick above the high of the Inside Day bar and a short position one tick below the low of the Inside Day bar on the days after the Inside Day (Figure 2 and 3).

The Outside Bar behaves in a different, partially opposite way. In this pattern the second day has a higher high and a lower low than the previous day. Thus the range of the second bar is bigger than that of the first bar. This means that the market is uncertain about its direction (similar to an Inside Bar) since within two days the direction was not completely clear. But in contrast to an Inside Day, in an Outside Day many traders have taken positions in expectation of a breakout instead of waiting. Thus many of them have been kept in a loss position

F1) Inside and Outside Bar Patterns

Inside Bar	Outside Bar

The chart on the left side shows an Inside Bar Pattern. That means, that the high is lower than the high of the previous day and the low is higher than the low of the previous day, too. The chart on the right shows an Outside Bar Pattern. In this case the high is higher than the high of the previous day and the low is lower than that of the previous day.

since the breakout has not taken place in their direction. The force of the Outside Pattern is mainly induced by these wrongly positioned traders that have to close their positions if the movement on the day after the Outside Day continues. Our strategy enters then on the day after the Outside Day a long position one tick above the high of the Outside Day bar and short one tick below the low of the Out-side Day bar. This entry logic is analogue to the Inside Day pattern.

But while the power of the Inside Day pattern is brought by the traders who have been staying out of the market and have tried to jump on the train when a breakout develops, the power of the Outside Day pattern comes from the traders who have entered the market in the wrong direction during the Outside Day and must jump out of the train. Thus we have two different reasons for the same result: a more likely breakout the days after one of those patterns occurred. This we exploit with our multiday pattern, which we call "Inside Out".

Finding Appropriate Exits

With the entry logic finished and looking sound, let us now develop the exits for the strategy. To find good exits we proceed as following: We take daily DAX data from January 2,000 to March 2005 as test data on which we optimise the exits. After having determined suitable exits for that period, we take the remaining market data of the last two years, from March 2005 to March 2007 as out of sample data to check if our found exits seem to be robust enough for real trading. As a data supplier, we took the datafeed of Tradestation 8 (*www.tradestation.com*). The DAX futures data which we used was backadjusted to avoid artificial gaps between different contract months. All computer tests in this article are calculated with 2 DAX points Slip-page and Commissions per Roundturn (50 € S&C per RT).

The exits are chosen in a way that they adapt themselves to the changing market value of the DAX. This is absolutely necessary because with fixed, static point exits your trading results usually vary much as the value of the DAX index varies over the years. For example, a 20-point stop in the DAX has a dif-ferent meaning when the DAX future is trading at 2,000-3,000 Points like in 2003 or when it trades around 7,000 points like within

T1) Test Period 01/27/2000 - 03/27/2007, Market: F-DAX, Points Value EUR 25

	All Trades	Long Trades	Short Trades
Total Net Profit	EUR151,338	EUR 62,150	EUR 89,188
Gross Profit	EUR 423,963	EUR 222,000	EUR 201,963
Gross Loss	(EUR 272,625)	(EUR 159,850)	(EUR 112,775)
Profit Factor	1.56	1.39	1.79
Total Number of Trades	300	161	139
Percent Profitable 52,33%		50.93%	53.96%
Winning Trades	157	82	75
Losing Trades	142	79	63
Even Trades	1	0	1
Avg. Trade Net Profit	EUR 504	EUR 386	EUR 642
Avg. Winning Trade	EUR 2,700	EUR 2,707	EUR 2,693
Avg. Losing Trade	(EUR 1,920)	(EUR 2,023)	(EUR 1,790)
Ratio Avg. Win:Avg. Loss	1.41	1.34	1.5
Largest Winning Trade	EUR 5,838	EUR 5,500	EUR 5,838
Largest Losing Trade	(EUR 6,513)	(EUR 6,.513)	(EUR 5,925)
Max. Consecutive Winning Trades	6	5	5
Max. Consecutive Losing Trades	7	6	6
Avg. Bars in Total Trades	4,.36	4.65	4.03
Avg. Bars in Winning Trades	5	5.72	4.21
Avg. Bars in Losing Trades	3.68	3.54	3.86
Max. Shares/Contracts Held	1	1	1
Total Slippage and Commission	EUR 15,000	EUR 8,050	EUR 6,950
Slippage and Commission per Trade	EUR 50		
Trading Period	6 Years, 11 Months, 19 Days		
Percent of Time in the Market	57.27%		
Longest Flat Period	34 Days		
Max. Drawdown (Intra-day Peak to Valley)			
Value	(EUR 22,313)		
Date	03/02/2007 22:00		

the last months. As a solution we use percentage based exits. We determine the exits as percentage values from the actual DAX value instead of using fixed point values. In todays market conditions with

F2) Inside Out Strategy

This chart shows a few signals which have been generated with the strategy. Inside Days ("ID") are marked with red, Outside Days ("OD") with blue circles. Entries are taken the days after a pattern is completed. The trades are exited if another entry occurrs or if profit target, stop loss or trailing stop are hit.

the DAX at 7,000 an exit distance of 1% means 70 points, 2% means 140 points etc. Note that we also tested exits based on volatility dependant stops and targets for our Inside Out strategy on the DAX. Such exits do not only adjust to the point value of the DAX index, but additionally to its current volatility conditions. However, since the results of those exits were not much different from the percentage based exits, we stuck to the percentage based calculation since it is easier to understand and to explain. For more details about the important topic of exits see also our earlier articles in TRADERS' Magazine [2,3].

Let us take our entries based on the daily Inside Day and Outside Day breakout patterns and vary our exit points in percentage terms (Figure 4). We tested three different exits in the period 01/27/2,000 - 03/25/2005: The profit target, the fixed stop loss and the trailing stop. All three exits were varied from 0.1% up to 10% of the DAX value. You can see that all three exits have one thing in common: If they are taken too close they decrease the net profit of the trading system. Positions are exited too quickly with small profits or losses due to the market noise that is always present. The market needs some room to develop into its final direction. Let us analyse the characteristics of the three exits. The stop loss (green line in Fig. 4) is a stop that is set a fixed amount from the entry and kept there. For our Inside Out system in the daily DAX future this stop has an optimal value of about 3-3.5 %. In that region the net profit reaches its highest values. Much smaller values cut the net profit the smaller they are taken. If you make the stop distance bigger you see that the profit goes down again and finally does not change any more. In that region above 5%, the profit is not affected by the fixed stop loss since the stop price was not reached any more by any of the generated signals. The trailing stop (red) behaves like the fixed stop loss. Values too close to this stop cut the profits drastically. In contrast to the fixed stop loss, the trailing stop does not show a maximum for a special distance, but rather improves in a nearly linear way the net profit the wider it is taken. If you make it bigger than 5%, however, it does not affect the signals any more since this stop is never reached. For the profit target (blue) the behaviour of the net profit is different. You can see two optimal profit target regions, one region around 3% and one region around 7%. Profit targets far below 3% are much too close whereas profit targets above 7% are too far away. But which of the two profit targets, 3% or 7%, would you take as a trader when trading that

F3) Tradestation 8 – Easy Language Code

```
{******** UJ 18.3.07-Strategy Inside Out: Entry Logic; Timeframe:
Daily, Intraday;
Code for Use with Tradestation 8 ****}}

{Definition of the Variables}
Vars: MP(0), EP(0), INSIDE(false), OUTSIDE(false);

{Assignment of the Variables}
MP = Marketposition;
EP = EntryPrice;
INSIDE = H < H[1] and L > L[1];
OUTSIDE = H > H[1] and L < L[1];

{ Break of Inside Bar}
If  INSIDE = TRUE Then Begin
        Buy next bar at H + 1 Point Stop;
        Sell short next bar at L - 1 Point Stop;
End;

{ Break of Outside Bar}
If OUTSIDE = TRUE Then Begin
        Buy next bar at H + 1 Point Stop;
        Sell short next bar at L - 1 Point Stop;
End;
```
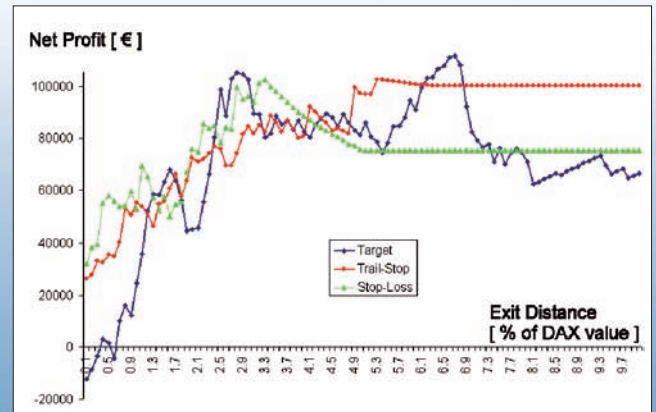
The code shows a program example of the Easy Language to code of Tradestation 8 which can be used as a basis for the entrance logic of the "Inside Out" strategy.
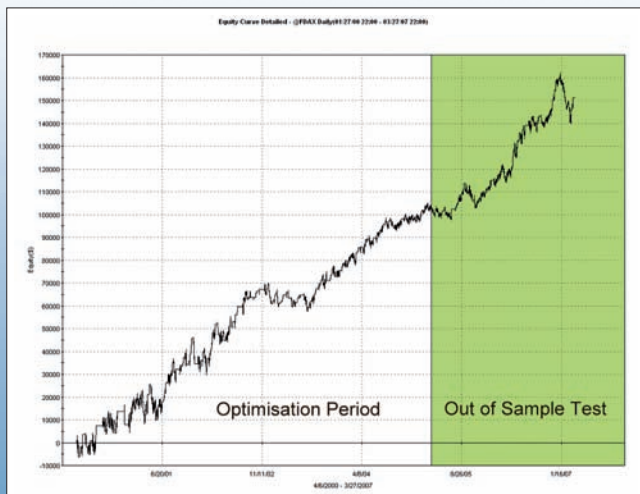
F4) Net Profit as a Function

The exits are calculated as percentage values of the current DAX value. E.g. if the DAX trades at 3,000, a profit target of 3.0% means 3,000 * 3% = 90 DAX points. Used data for calculation: Back-adjusted DAX future from 01/27/2000- 03/25/2005. Incl. slippage and commission of 2 points per Roundturn.

system? We preferred to take the 3% target for the following two reasons. First, the closer target reduces the market risk of our system since the time in the market is reduced. More important for our selection is the observation that although the net profit is a bit smaller with the closer profit target, the equity line (summation of the results of all trades) looks smoother in that case. The far away 7% profit target showed good results in the volatile equity market phase in the years 2,000-2002, but lost its power afterwards in the years 2003-2005. When the volatility had decreased significantly, the 7% target often was too far away and the exit lost its effectiveness. From these findings we set our optimal exit values to 3.3% for the fixed stop-loss, to 5.3% for the trailing stop and to 3% for the profit target.

With these optimised exits, we check the behaviour of the trading system on the last two years on out of sample market data (Fig. 5 and Fig. 6). You can see that the out of sample test (green area) confirms the result of the optimisation period. The equity line continues to grow nearly with the same slope within the last 2 years as in the years before. You can also see in the equity line that a bigger drawdown happened just recently. If you look at the weekly underwater equity curve in percentage terms, it is revealed that this drawdown was nothing exceptional compared to earlier drawdowns that took place within the test period.

Let us have a closer look on the system figures of the complete period (Table 1). In 7 years the system produced a total net profit of more than 150,000 Euro including a total of 15,000 Euro for Slippage and Commissions. The profit of our system is relatively equally splitted between long (62,150 Euro) and short trades (89,188 Euro), which is an evidence of the robustness of the developed strategy. The biggest drawdown is 22,000 Euro - small compared to the net profit, but it shows how much capital can be necessary to trade one single DAX future. Many traders who are not diversified over several markets and trading systems or trade with minimal funding would not be able to stand such a phase of a trading system. Having a look at the trade figures of the strategy you can see that within the tested 7 years 300 trades took place of which 52% were profitable. Thus the high profitability of the system does not mainly come from a high percentage of profitable trades but more from the fact that the average winning trade was a factor 1.41 bigger than the average losing trade. An interesting fact of the DAX future is revealed when looking at the time dependant system figures: The time in long trades (4.65 days) was significantly longer than the time in short trades (4.03 days). This underlines a fact which is well-known for experienced traders: Equity markets usually climb up slower than they go down. As long as stocks are going up people have no hurry, but when the market is crashing they do not have much time to jump out. As a consequence of this observation, when designing trading systems for equity markets it is useful to choose different dynamics for the long and short side. As our trading system Inside Out is built completely symmetric concerning long and short side, there is a small possibility to improve it.

Conclusion

Although the Inside Day and Outside Day patterns are in every trader's toolbox, it is still possible to use them to build successful trading systems. The reason why these patterns work is that they have a logic behind them that is based on market psychology and contains no optimisation. The Inside Bar and Outside Bar are both patterns which express a phase of an indecisive market, from which a breakout lasting several days can occur. Having found such entries we have shown how
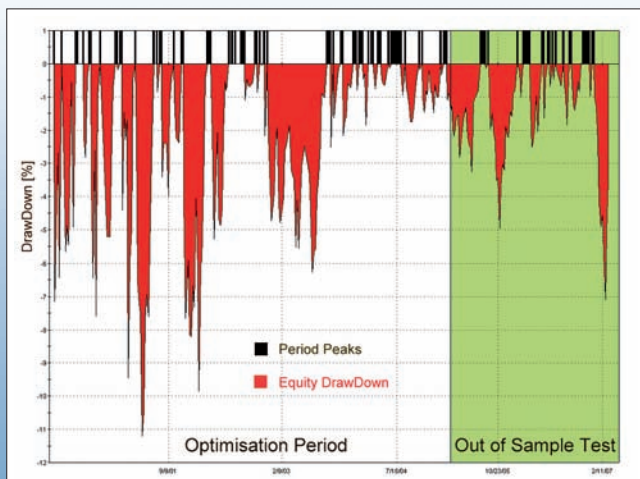
F5) Detailed Equity Curve

In the white area (01/27/2000- 03/25/2005) the exits were optimised. The green area shows the out of sample test within the last two years (03/25/2005- 03/25/2007). Results include slippage and commission of 2 points per Roundturn.

References

[1]   Enrico Malverti, "Trading Systems for Tradestation and Visual Trader", www.tradinglibrary.it

[2, 3]   Emilio Tomasini, Urban Jaekle: "Developing Exit Strategies", Part 1 and 2, TRADERS' April and June 2006

care in the process of system development to do no curve-fitting or optimisation, the real trading results are usually up to a factor of two worse than the theoretical equity curves based on backtests! In our opinion, to steadily increase your capital in spite of these difficulties the only successful way is to have a portfolio of different, low correlated systems that you apply within a bigger portfolio to several low correlated markets. In this way you are not dependant on one single market or, even more frightening, on one single system. Supported in the bad times by other systems, every thoroughly developed, robust strategy will soon show its inherent strength again and reward you for your statistical work.

■ ■

to find appropriate exits. In contrast to the robust entry patterns that were taken in original form without any optimisation, for the exits we selected a different way. We adapted them to our entry logic within an optimisation period of 5 years and checked their effectiveness on a two year period that was out of the sample test period. The result was a growing equity curve which contained a small warning with a recently happening drawdown. This observation underlines a fact that we often found from our experience when applying trading systems in reality that we had developed on paper. Even by taking the highest

F6) Weekly Underwater Equity Curve

The Underwater-Equity curve focuses on drawdowns. They are shown in percentage terms as huge red peaks. In contrast, new equity highs are just expressed with a small black line. Again, as in Fig. 5, the green area shows the out of sample test within the last two years (03/25/2005- 03/25/2007), whereas within the time before the exits had been optimised. Results include slippage and commission of 2 points per Roundturn.

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